

## **The Main Oil Source Formations of the Anambra Basin, Southeastern Nigeria**

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Anambra basin is one of the basins in Nigeria, harbouring the largest deposit of sub-bituminous coal and lignite. Oil seepages have also been reported from parts of the basin. The potential of the coal and other formations as source rock for the oil seepages is yet to be fully understood. This study therefore aims at identifying the source rocks and the geochemical composition of the oil seepage. Detailed lithologic profiles were carried out on the following geological formations: Asu River, Eze-Aku, Awgu shale, Nkporo Shale, Mamu, Enugu Shale, and Ameki Formations and 50 samples were selected. Organic geochemical analysis involving total organic carbon content (TOC), Rock-Eval pyrolysis, and Gas chromatography (GC) were carried out.

The Asu River, Eze-Aku, Awgu shale, Nkporo, Mamu, Enugu, and Ameki Formations, have average TOC values of 0.68, 2.7, 2.0, 3.09, 56.1, 3.26, and 1.56 wt%, respectively. This indicates that both shale and coal have adequate organic matter to generate hydrocarbon. The plot of TOC against Hydrogen index (HI) suggests that the coal samples are of type III/IV kerogen while that of the shale sample suggest type II/III kerogen (mixed environment).

The level of thermal maturity as estimated from the plot of Tmax against production index (PI) suggest that the shales range from immature to marginally mature source rock while the coal is of low level conversion. The GC result indicates that the n-alkanes and isoprenoids in the oil seepage samples are completely depleted while steranes are seriously altered. Regular steranes {C27aaR, C28aaR and C29aaR} and C29, C30, C31 Hopanes are all consumed up, but Diasteranes {C27Dbas, C27DbasR} and 25-Norhopanes (C28, C29) are relatively high. This suggests that the oil seepage is highly biodegraded and on level 9 of Peter and Moldown (PM) scale.

The geochemical analyses of some selected samples showed that there are high organic richness in Eze-Aku, Awgu, Nkporo, Mamu (coal), and Enugu Formations and they could be regarded as the main oil source formations of the Anambra basin.